Periscope.

a.—ANATOMY AND PHYSIOLOGY OF THE NERVOUS SYSTEM.

Function of the Brain.—Dr. H. Nothnagel (*Virchow's Archiv*, LVIII., 420, Nov., 1873) continues the publication of his researches on the functions of the brain. A number of experiments are detailed, and some very peculiar phenomena described. He found that by the simple puncture, with a fine needle, in a circumscribed region of the posterior portion of the brain, on either the right or the left side, he produced the most violent springing movements of the rabbit, which generally either entirely ceased in two or three minutes, or left merely a slight medianwards deviation of the limbs and curvature of the spinal column. In some sixty different experiments, positive phenomena of this kind were produced in twenty-three; that is, the circumscribed portion of the brain, the wounding of which caused these remarkable movements, was punctured. No disturbance of sensibility of any part of the body was detected in these experiments. The region of the brain which, by puncture, caused these phenomena, is on the inner side of the posterior portion of either hemisphere, over the anterior part of the corpus quadrigeminum, and most commonly in a white, fibrous mass, surrounded by gray matter, which must be penetrated to the depth of one-half a millimetre by the needle in order to produce the effects described. The author does not attempt to explain these appearances, but merely gives the description.

Altogether negative results followed similar experiments on the cornu ammonis.

Experiments were also made on the optic thalami. Slight wounding of the upper surface with the needle produced no very marked results. Deeper puncture, in the posterior portion, caused deviation of the head and anterior limbs; and a horizontal cut brought about the phenomena already described by Schiff, in his *Lehrbuch der Muskel und Nervenphysiologie*, with some few additional peculiarities, which the author mentions; such as a momentary movement of the animal toward the wounded side, the hinder extremities remaining undisturbed, etc. As regards disturbances of sensibility, he thinks that he sometimes detected a slight hyperalgesia, more particularly on the injured side; but it was not very decided.

Dr. Nothnagel concludes his paper with a sharp criticism and analysis of some of the experiments of Fournie, which were noticed in the review department of the January number of this journal. He, himself, abstains from offering any general conclusions, deeming the subject as yet too little known, and that hasty generalizations can only have the result to bring the facts already won by careful experiment into discredit.

A communication from Dr. Nothnagel also appears in the *Centralblatt der Med. Wissenschaften*, No. 56, Dec. 13, 1873, in which he states that in the rabbit precisely similar effects are produced by the simultaneous extirpation of both nuclei lenticulares as by the removal of the two cerebral hemispheres. All voluntary motion ceases, though reflex movements continue to be produced.

M. Carville presented, on behalf of himself and M. Duret, at the *seance* of the *Soc. de Biologie*, Jan. 3 (report in *Gaz. Med. de Paris*, Jan. 24), a communication relative to the excitability of the cerebral hemispheres by faradic currents, in which he criticised the recent investigations and conclusions of Dr. Ferrier, in regard to the location of the functions of the brain. The aim of these authors is to show that the phenomena described by Ferrier and others are not due to localized excitation of cortical centres, but to transmitted irritation of the cerebral ganglia and peduncles. They repeated the experiments of Dr. Ferrier, and then, afterwards, endeavored to obtain the same results when the animal was completely under the influence of anæsthetics, but found them altogether different. The following are the principal points of his communication:

1. When the anæsthesia was imperfect, it was possible, by applying the electrodes successively to the surface of the convolutions, to reproduce some of the movements described by Ferrier in his memoir.

For example, the excitation of the anterior portion of the external superior convolution, caused the raising of the fore paw, the flexion of the toes, the elevation of the shoulder, etc., of the opposite side; while, on the other hand, the excitation of the second and third external convolutions produced a rotation of the head toward the opposite side, etc., etc.

Some of these movements the authors attribute to conduction of the electric excitation to the muscles by the liquids which bathe the surface; others by the direct diffusion of the excitation through the substance of the cerebrum; and test experiments appeared to demonstrate the correctness of both of these suppositions.

2. When anæsthesia was complete, no effects were obtained by the excitation of the convolutions with any intensity of the current. Neither the centres described by Ferrier as regulators of the associated movements of the fore paw, nor those of the posterior paw, or the lips, or the eyelids, were manifested by electric irritation.

The authors ask, Why do anæsthetics prevent the movements caused by exciting the hemispheres ? and review the hypotheses which present themselves to explain the fact. The first of these—that the anæsthetic produces such a change in the cortex as to prevent the electricity from acting on the muscular centres—is disposed of in a few words as inadmissible. The anæsthetic has no power to prevent the diffusion of the current; and the theory as to alterations of the cells is equally untenable.

The second hypothesis is that proposed by Schiff and Dupuy, that these movements, thus produced, are of a reflex nature; and that the anæsthesia hinders or prevents these. MM. Carville and Duret do not admit this theory, as the point of departure for a reflex movement is wanting, the convolutions not being excitable.

The third hypothesis is the one adopted, and is simply that the currents applied to the surface only act by exciting the corpus striatum and the peduncles; or, in short, those portions of the cerebrum which are known to be excitable. Anæstheties affect the medulla, and through it gradually suppress the excitability of the various organs. When, therefore, the animal experimented upon is under their influence, the diminished excitability requires stronger stimulus; until, when the loss of sensibility is complete, the reaction ceases altogether.

M. Carville sums up his opinions in the following conclusions:

The peripheral layer of the hemisphere is unexcitable, insensible, and contains no motor centres.

The effects obtained by faradization, which penetrates to the corpora striata and peduncles, are due to the direct excitation of those organs.

These effects cannot be attributed to any reflex action.

Complete anæsthesia, which hinders these effects, does not at all change the conditions of the peripheral stratum of the hemispheres, but acts merely by more or less diminishing the excitability of those parts of the hemisphere which are universally recognized as excitable.

The following are the conclusions of a note presented to the *Soc. de Biologie*, Jan. 3, by M. Dupuy:

1. The conclusions of M. Ferrier's memoir cannot be accepted, because that observer has never troubled himself to find out whether the electric currents (faradic, as he terms them), which he used in his experiments, diffuse themselves, or not, through the encephalon. By the aid of a galvanoscopic frog, I have been able to prove that, in fact, they are so diffused; and that consequently we cannot claim, any more than before, that the cortical layer of the brain is excitable by electricity.

2. We cannot localize the nutritive or functional centre of any nervous conductor in a particular cerebral convolution, as Ferrier proposes, because, when the animal operated on is completely anæsthetized, electrical irritation of the cortex causes no contractions; while in the same animal, and with the same electrical current, the direct irritation of the sciatic nerve, previously laid bare, causes a contraction of the muscle to which it is distributed.

Dr. Edward Hitzig publishes, in the *Berliner Klin. Wochenschrift*, No. 6, Feb. 6, an account of the electrical exploration of the brain of an ape (*Innuus rhesus*). Both the constant and the induction currents were employed, and the following general results claimed: The anterior central convolution is the general centre for the muscles of the body; and the special centres for the different sets of muscles were found distributed in it as follows: Close to the great longitudinal fissure, separated from it about three millimetres, was the centre for the hinder extremities. That for the anterior limbs was found about three millimetres more to one side; and still seven millimetres farther in the same direction was the centre for the parts innervated by the facial nerve. Finally, close to the sylvian fissure, he found the centre for the muscles of the tongue, mouth, and jaws. This last is interesting, from the fact that lesions in this same neighborhood are so frequently connected with aphasia in the human subject.

A comparison is made of the anatomical relations in this case and those of the dogs' brains experimented upon by the author, and the homologies of the convolutions pointed out.

We extract the following from the Cincinnati *Enquirer* of March 24th. Although not coming to us directly from a medical source, the main facts are well accredited; and we are informed that a full account of the experiments will appear in the *American Journal of Medical Sciences* for April.

"An *Enquirer* reporter went to the Academy of Medicine last night to hear the report of the Committee on Ethics on the case of Dr. Maley, in causing the arrest of a physician in an alleged abortion case. The Committee was not ready to report, and the Academy adjourned, but was, upon the arrival of Dr. Roberts Bartholow, one of its members, called together to listen to that gentleman explain the recent wonderful experiments made by him upon the brain of a patient at the Good Samaritan Hospital with the galvanic battery. The patient was a woman inflicted with an incurable disease, and almost in *articulo mortis* during the three weeks that the experiments continued. An accident of her childhood, that of falling into the fire and burning the back part of the head, so that instead of a scalp only a cicatrix formed over the brain, had brought her to the hospital. This cicatrix became the seat of a cancerous disease, which ate away the skull and left the brain exposed, making her a fit subject for experiment.

"Dr. Bartholow had the brain of the subject hardened by chromic acid for exhibition ; also, photographs of the face of the patient and of the exposed portion of the brain experimented upon. In the first place, he ran over the history of experiments upon the brain of living animals.

"In the case of the Good Samaritan Hospital, the patient was a woman about thirty-two years old. A large part of both hemispheres of the brain was exposed by the eating away of the bones by a long-standing cancer. The Doctor said that, as the brain had frequently been penetrated by the surgeon's knife, and portions lost by accident, without obvious detriment to the patient, he assumed that he might, with the same impunity, introduce extremely fine needles for electrical experiments. This he did. These needles were insulated to near the point, so that the electrical current, when applied, could be confined to a small extent of brain substance. These needles, during the three weeks of experimenting, were introduced about ten times in each hemisphere, to the depth of from a twelfth part of an inch to an inch and a half, and at distances apart varying from a quarter of an inch to an inch. What he termed a Faradic current, which we suppose scientific readers will understand, was applied—the very weakest that could be used.

"The first point demonstrated was the insensibility of the dura mater, and of the brain substance itself. The patient was absolutely unconscious of the presence of the needle when introduced, though in the entire possession of all her faculties.

"The presence of the needle of itself, when it penetrated to a certain depth, was felt by the patient, not where the needle was, but in the extremities on the side of the body opposite to that of the hemisphere of the brain penetrated, chiefly in the hand and arm. For instance, when the needle penetrated the left hemisphere of the brain, pain and tingling were felt in the right arm and hand; and when it penetrated the right hemisphere of the brain, a like pain and tingling were felt in the left arm and hand.

"When the needles were connected with the galvanic battery, distinct muscular movements occurred on the side opposite to the hemisphere of the brain in which the needles were. The pain experienced in the extremities was also much more decided.

"Another phenomenon was what the Doctor termed the 'choreic movements,' which, being explained, are a nodding of the head and moving of the hands up and down. These were on the side of the body opposite to that of the brain in which the experiment was going on. A stronger electrical current applied to the right hemisphere, caused, the Doctor said, 'an unilateral epilepsy of the opposite side, of great violence.'

"Dr. Bartholow stated that upon a *post-mortem* examination he had found that the traces of the paths of the needle were distinctly visible in the brain substance, and that brain substance had been destroyed to make a path for the needle. After he had concluded his very brief but lucid statement, the matter was opened for remark and discussion.

"Dr. Kearney said he would like to hear opinions as to how far such experiments should be permitted, in view of their possible effect of causing the death or shortening the life of the patient.

"Dr. Bartholow said the insertion of the needles caused injury. He was emboldened to make the experiment by the fact that surgeons had penetrated the brain with the knife to let out ulcerous matter, and that portions of the brain had been removed by accidents, without being followed by loss of life or serious injury. Since, in strangulated hernia, puncturing by fine needles was employed with success, and also in many cases the bladder was punctured with fine needles, he felt that the experiment might be safely made upon the brain, especially in a case like this, which was necessarily hopeless.

"Dr. Kearney said that the using of the knife to penetrate the brain, by Dr. Detmold, was a different case; then it was necessary to save the patient's life. He wanted to know whether in an inevitably hopeless case a doctor was justified in making an experiment that might shorten the patient's life?

"Dr. Ludlow wanted to know if in this case the acceleration of the disease by the experiment did not probably hasten the patient's death?

"Dr. Bartholow said that, in regard to the question of humanity, he felt, before the experiment, that fine needles might be used with impunity. Now, with the knowledge of that experiment and the *post-mortem*, that the needles did inflict injury, he would never again repeat that experiment.

"Dr. Carson had some doubts whether there was not a complication of conditions that might vitiate the conclusions.

"Dr. Muscroft was glad the experiment had been made, and he did not see why such experiments should not be made in the future, where opportunity offered, in the cases in which death was inevitable, and the patient consented to have the experiment made."

[We know of no *a priori* reasons why, in a case like this, the experiments should have any influence whatever on the prognosis, and have little doubt but that the patient lived as long under these circumstances as under any other conditions. Although altogether exceptional among recent physiological investigations, the experiments are of the highest importance, and we shall look for the complete report of them with great interest.—EDS.]'

THE FUNCTION OF THE SEMICIRCULAR CANALS.—Prof. E. Cyon, in a paper published in *Pflueger's Archiv*, 1873, 306, in which he gives, at length, descriptions, etc., of experiments performed on animals by himself and others, concludes that the function of the semicircular canals is to assist in maintaining the equilibrium "by a series of unconscious (auditory?) sensations," informing the animal of the position of its head in space; and that each semicircular canal has a sufficiently defined connection with one of the dimensions of space.

The disturbances of movements which are produced by the section of these canals, he divides into three classes: 1st, Those due to disturbances of equilibrium, directly following the injury; 2d, Forced movements, caused by abnormal auditory sensations; and, 3d, Subsequent phenomena, appearing some days after the operation, and due to the consequent inflammation of the cerebellum.

REFLEX INNERVATION OF THE VESSELS.—E. Pick (*Reichert u. DuBois Reymond's Archiv*, 1873, 1) publishes an account of his observations on the reflex innervation of the smaller vessels of the natatory membrane of frogs. The animals were prepared by being put moderately under the influence of curare; and the membrane of the second digital interspace was selected for the observations. The irritation was applied by means of the induction stream, or by dilute acetic acid. The smaller the vessels, and the stronger the irritation, the quicker and more pronounced was the corresponding reflex contraction. In the larger vessels, a dilatation followed the contraction, which, as the arteries thus dilated responded but slowly, and to a slight degree, to subsequent excitation, the author considers as an evidence of fatigue. The irritation of different regions of the cutaneous surface acted differently in producing these reflex effects. The skin of the face was the least sensitive, and that of the back the most so. The route of the vasomotor nervous influence was exclusively in the sciatic nerve.

CONNECTIVE TISSUE OF NERVOUS ORGANS.—M. Louis Ranvier, in a note communicated to the Acad. des Sciences by M. Cl. Bernard, Dec. 1, 1873 (*Gaz. Med. de Paris*, Jan. 3), gives it as his conclusion that the cells of Deiters, described by that author, Golgi, Boll, and others, in the nervous centres, have no real existence. He says if these cells do exist, as described, and form the fibrillary stroma of the nervous centres, there is then an important morphological difference between the conjunctive tissue of the central nervous system and that of other organs. He is convinced that this difference does not, in fact, exist; and that the conjunctive tissue of the spinal cord, and that of the peripheral nerves, for example, are constructed on the same type. Other competent persons, who have examined his preparations, are in accord with him on this point. He concludes by saying: "*En resume*, the conjunctive tissue of the spinal cord is composed of connective fibres, in bundles and flat cells. It appears with the same characters in all the organs I have so far studied, and particularly in the peripheral nervous cords; but in the nervous centres, the arrangement of the fibres and cells is such that the figures thus formed have deceived histologists into believing them to be ramified cellules."

THE STRUCTURE OF THE TACTILE CORPUSCLES.—Geo. Thin, M.D. (*Jour. of Anat. and Phys.*), gives the results of his microscopic investigations on the structure of the tactile corpuscles of Wagner, carried on by him in Prof. Stricker's laboratory in Vienna. He found, by means of osmic acid preparations, that these corpuscles were both simple and compound; that is, one or more separate corpuscles may be inclosed in a common capsule. The nerve fibres were carefully followed after they entered the capsule; and the conclusion arrived at is that "each single corpuscle and each member of a compound corpuscle, represents the termination of a single medullated nerve fibre."

The transverse elements are declared to be the nuclei of oblong cells, which anastomose with each other by means of prolongations of elastic tissue fibres.

The division of the papillæ of the skin into vascular and nervous, is not borne out by these investigations. A majority of the papillæ which contain touch-corpuscles, contain vessels also; and nerve fibres are found in a proportion of those which contain vessels and no touch-corpuscles.

INHIBITION OF REFLEX ACTION BY HEATED BLOOD.—M. Foster (*Jour. of Anat. and Phys.*, Nov., 1873) discusses the phenomena, first observed by Goltz, that a frog deprived of its cerebrum, when placed in water, the temperature of which is gradually raised, dies without struggles; while, in the uninjured animal, the reverse is the case. From his investigations, he concludes that the absence of reflex action, in Goltz's experiment, and the other modifications of it, are due primarily and chiefly to the depressing influence of heated blood, carried from the skin to the spinal cord, which comes into play by virtue of the gradual character of the stimulation. When the stimulation is sudden, violent movements are produced; but in the other case, the sensibility of the cord is already blunted before the temperature has become sufficiently high to actively stimulate the peripheral sensory nerves; and when this point is reached, the spinal cord is so deadened as to require a still stronger impulse for the production of reflex movements; and so on, stage by stage, till the animal is fairly boiled without having made a sign.

The reason why an uninjured frog does not act in the same manner, is given, that a much less intense sensory impulse is required to call forth a movement of volition than a simple reflex action; that is, one produced by the spinal cord alone, without the intervention of the brain.

SYMPATHETIC.—G. Gianuzzi (*Ricerche eseguite nel gabinetto di Fisiologia della R. Universita di Siena;* abstr. in *Centralbl. der Med. Wissensch.*) has tested the relations existing between the spinal cord and the system of the grand sympathetic, by the Wallerian method. He opened the spinal canal of dogs, and cut the nerve-roots on either side of the spinal ganglia, and then, after a time, examined the rami communicantes of the sympathetic. The results are summed up as follows:

1. The rami communicantes, in mammals, consist almost entirely in fibres, which have their centres of nutrition in the cord and spinal ganglia; still, there are a few fibres (altogether lacking in some communicating branches) which are dependent, in this respect, on the sympathetic ganglia.

2. These fibres, which are always distinguishable through their fineness, and generally, also, by their lack of double contour, go from the sympathetic ganglia to the spinal roots, through the communicating branches.

3. The number of the motor fibres sent from the spinal cord to the sympathetic is variable, but is always greater than the number of sensible fibres. The number of these last varies very much in the different rami communicantes.

4. The "actio nutritiva" of the cord and spinal ganglia extends its influence on the nerve fibres, after they have penetrated the ganglia of the sympathetic.

The same animals which had served for these researches were also experimented upon to test the irritability of the posterior columns. These, after the section and degeneration of their sensible roots, gave a positive reaction, and are, therefore, to be considered as irritable.

Microscopic examination showed that the degeneration of the sensory roots frequently extended into the substance of the cord.

C. Eckhard (*Centralblatt der Med. Wissensch.*, No. 35, 1873) contradicts the statement of Sinitzin (*Cbl.*, 1871, 361), that the extirpation of the superior cervical ganglion of the sympathetic prevents the occurrence of the usual alterations of nutrition, etc., in the eyes and lips, following the section of the trigeminus; or that, if these are already exhibited, after a previous section of this nerve, it renders them less pronounced. His experiments, made with great care, appeared to show that when the section of the trigeminus is complete, that of the sympathetic has no influence on the consequent alterations.

RESEARCHES ON THE CHORDA TYMPANI.—M. J. L. Prevost (*Comptes Rendus*, Dec. 30, 1872), and M. A. Vulpian (*Comptes Rendus*, Jan. 3 and March 10, 1873; abstracts in *Revue des Sci. Medicales*)—M. Prevost discovered that, after destruction of the chorda tympani, either by section of the facial, or in the ear, there always followed, in nine or ten days' time, degeneration of the terminal branches of the lingual nerve, as far as the fibres of the deep submucous layer. After the destruction of the spheno-palatine ganglion, or section of the Vidian nerve, the chorda tympani remained uninjured.

In 1863, MM. Vulpian and Philipeaux showed that in the dog, after section of the hypoglossal nerve, the lingual nerve of the same side acquired motor powers not previously belonging to it. According to recent researches of M. Vulpian, it is the chorda tympani, and not the lingual, that presents this singular physiological modification; *i. e.*, the nervous fibres which join the lingual from the chorda tympani acquire this property, and not those of the lingual itself. It yet remains to be seen why these fibres do not exhibit this peculiarity until some time after the section of the hypoglossal.

M. Vulpian also sought to determine the vaso-motor supply of the tongue and sub-maxillary gland; and, from his experiments, concluded that the dilator nerves also are solely derived from the chorda tympani. He electrized this nerve, with the lingual intact, and with it divided; and in both cases produced the symptoms of hyperæmia of the tongue. Then, after cutting the chorda tympani and awaiting its degeneration, he electrized the lingual without producing any signs of increased vascularity whatever. With regard to the constrictor fibres for the vessels, his experiments seemed to prove that they are mainly derived from the mixed lingual, though, in the dog and rabbit, the hypoglossal seemed to contain a few. The dilating fibres predominated in the lingual; for, on its section, and the electrization of its cut peripheral portion, the permanent redness of the tongue was notably augmented.

It can now be easily seen how facial paralysis may disturb the sense of taste; for the function of the lingual mucous membrane must be more or less affected by its vascularity.

M. J. L. Prevost (*Arch. de Phys.*, July, 1873) concludes his article on the gustative functions of the chorda tympani, narrating and discussing several additional experiments on cats, rats, and guinea-pigs. The following are given as the complete *resume* and conclusions:

1. The section of the two spheno-palatine ganglia does not induce, in the dog and cat, sensible modifications relative to the gustatory functions of those parts of the tongue supplied by the lingual nerve.
2. After the section of the two chordæ tympani, made in dogs and cats deprived of the glosso-pharyngeal nerves, the taste was slightly modified in certain cases, notably diminished in others, and altogether abolished in one. Our results do not permit us to specify the part which the chorda tympani takes in the function of taste. Meanwhile, we are inclined to accord to it only an accessory *role*.
3. Contrary to the former observations of Prof. Vulpian, and conformably to his more recent researches, we have found that the chorda tympani sends fibres to the terminal branches of the lingual, as also to the sub-maxillary gland. We have found, after the section of the chorda tympani in the cat, the dog, the rat, the rabbit, and the guinea-pig, degenerated nervous fibres, either in the terminal branches of the lingual, the mucous layers of the tongue, or in the sub-maxillary gland.
4. The chorda tympani has no trophic centre in the papillæ of the tongue; and if the sub-maxillary gland acts on it as a trophic centre, its influence must, at least, be only limited. After the section of the chorda tympani in the ear, the central end of this nerve, on the side of its facial emergence, remains sound.

M. Vulpian publishes (*Archives de Physiologie*, 1873, 598) new researches on the motor supply of the tongue. In a number of dogs, he united the peripheral portion of the severed hypoglossal to the central end of the lingual, after it had been divided. In three of the animals, which survived the operation long enough to allow the regeneration of the fibres along the course of the (so to speak) compound nerve, a period of several months, he cut the chorda tympani in the ear, and then submitted the central end of the lingual to galvanic irritation. In one case, where subsequent microscopic examination showed that the chorda tympani had been only partially severed, strong contractions of the corresponding half of the tongue followed the application of the stimulus. In the others, on the contrary, this branch being completely divided, not the least contraction was observed. The continuity of the motor fibres derived from the facial nerve, through the chorda tympani, was necessary for contraction to ensue.

These results seem to bear against the author's former hypothesis in general physiology, drawn from experiments by himself and M. Philipeaux, that the nerve fibres conduct sensory or motor impulses indifferently, as they are in connection with the central or peripheral organs of either function.

M. Vulpian, in a communication to the Academie des Sciences, Feb. 2, 1874, repeats the statement that the contractions failed in galvanization of the lingual, after the complete section of the chorda tympani, and admits that his former hypothesis cannot be sustained.

DEVELOPMENT OF NERVE CELLS. — Dr. A. Lubimoff (*Centralbl. f. d. Med. Wissensch.*, 1873, No. 41) gives the results of investigations on the embryonal development of nerve cells, undertaken by him in the course of a study of the pathological processes in the sympathetic system. His examinations were chiefly made on human embryos, ranging from the middle of the third month to birth. He ranges the order of development of the ganglion cells of the different parts of the nervous system as follows, in the descending order:

1. The sympathetic nerve cells of the Gasserian ganglion; the ganglion trunci inferins nervi vagi; and the intervertebral ganglia.
2. The sympathetic nerve cells of superior cervical ganglion; the thoracic ganglia of the sympathetic cords; and the cœliac ganglion.
3. The nerve cells of the spinal cord.
4. The nerve cells of the cerebrum and cerebellum.

According to these conclusions, the cells of the sympathetic are developed earlier than those of the cerebro-spinal centres; and in the latter those of the spinal cord (especially those of the anterior cornua, according to one author), than of the brain.

To an abstract of this paper, in the *Psychiatrisches Centralblatt*, Dec., 1873, Dr. Obersteiner adds, in reference to the fourth of these conclusions, that the cells of the cerebellum, at least, the large Purkinje cells, appear to be developed at an earlier period than those of the cortex cerebri; while in the cerebellum itself, again, the cells of the nucleus dentatus reach a very high degree of development at a relatively very early period.—*Beitr. z. Kenntniss v. fein. Bau der Kleinhirnrinde. Sitzungber. d. k. Akad. der Wissensch.*, IX. Bd., 1869.

Chemical Reaction of Nervous Organs.—R. Gscheidlen (*Pflueger's Archiv.*, VIII., 1873, 171) gives an account of experiments as to the chemical reaction of the central nervous organs. He employed for this purpose gypsum or clay plates, prepared with litmus.

The gray substance of the brain gave always an acid reaction; the white a neutral or weak alkaline one. The results were identical, no matter whether the animal had been killed or was yet alive, as was the case in some of his experiments. The gray and white matter of the cord, and the ganglia and nerve fibres reacted in the same manner; but heat changed the reaction, in the white substance, to acid, in all parts of the nerve centres.

By analysis, measurable quantities of lactate of lime were obtained from the gray substance of the brain of animals, and traces of the same in the medullary substance.

Reaction of the Sensory Nerves.—A. Heinzmann (*Pflueger's Archiv.*, 1873, 222) discusses the question as to whether the sensible nerves react to very gradual alterations in the strength of the irritation. From his experiments with thermal irritants, it would seem that the sensible nerves, like the motor, fail to react under very gradual alterations of the exciting force.

b.—PATHOLOGY OF THE NERVOUS SYSTEM AND MIND, AND PATHOLOGICAL ANATOMY.

Paralysis of Tuberculous Meningitis.—The *Gaz. des Hopitaux*, Jan. 15, 1873, contains the following conclusions of a work on the paralysis of tuberculous meningitis, by Dr. H. Rendu. Paris: A. Delahaye.

1. The paralyses which occur in the course of tuberculous meningitis are nearly always among the later accidents of the second period, and frequently the ultimate complications. In a clinical point of view, they may be divided into transient and permanent paralyses.

2. The transient paralyses are nearly always preceded by violent convulsions. In their locality, progress and duration they are governed by no fixed rule.

3. The permanent paralyses, on the other hand, whether complete or incomplete (the latter are the most frequent), are sometimes preceded by slight convulsive twitchings, generally of no great violence, and sometimes supervene gradually in the midst of a progressive coma. They occur usually on one side of the body; they may be either general or partial, invading at the same time the members and several cranial nerves. There frequently exist relations of succession and coincidence between these paralyses and other troubles of motility, such as convulsions and contractions.

4. The sensibility is nearly always simultaneously affected—rarely under